MILL SECTION of

Concrete

Vol. 29 July, 1926 No. 1

New Canadian Cement Plant

Description in Detail of First New Canadian Cement Plant in Ten Years—Located Inside City of Montreal—Dry Process Plant Considered Best Under Prevailing Conditions—Favorable Raw Materials at Hand—Water Transportation Available

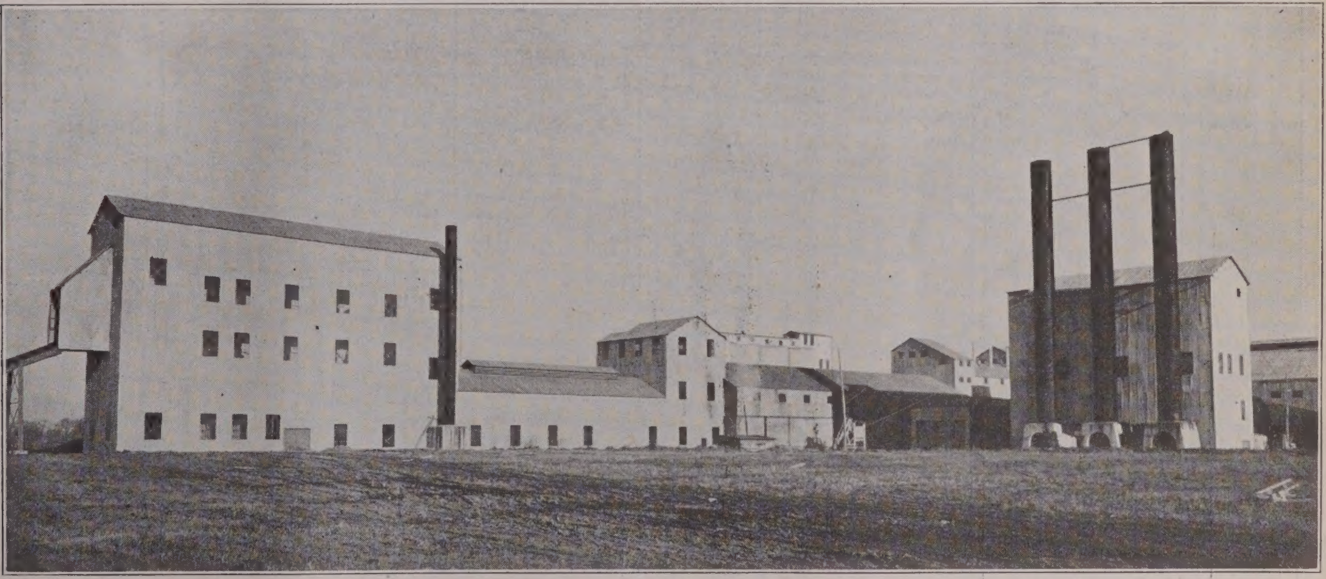
By RICHARD K. MEADE

DURING the early part of January the new cement plant of the National Cement Company, Montreal East, Quebec, was placed in operation and the first shipments of cement from this mill were made early in February. One kiln was fired January 6, a second kiln January 18, and the third kiln in April. This plant is the first to have been built in Canada in the last ten years, and in point of equipment and raw materials is the equal of any which has been constructed anywhere else in the world.

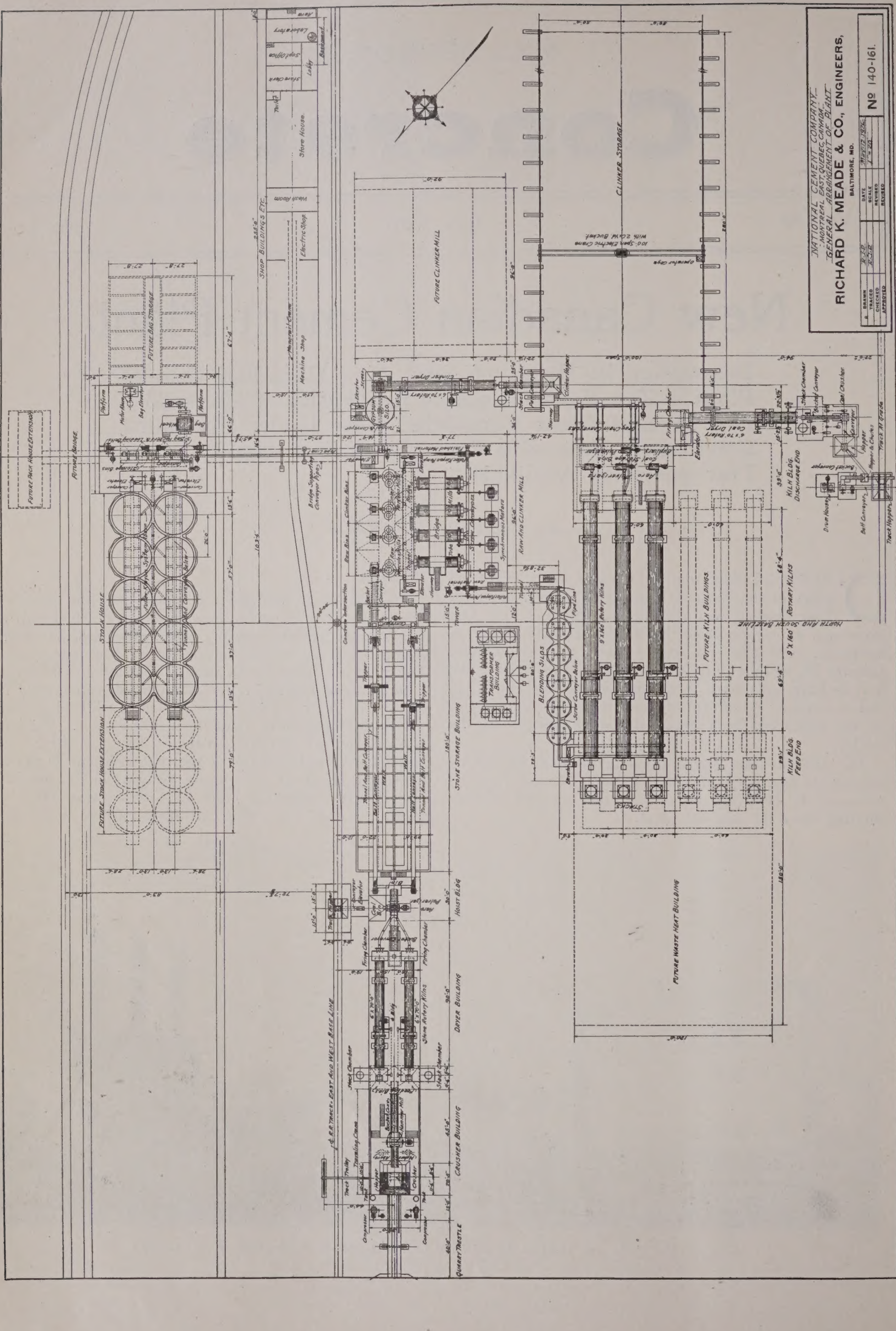
The present plant has a capacity of 3000 barrels of cement per day, but is so laid out that the capacity can be increased to 6000 barrels at any time desired without shutting down the original plant.

Location

The mill is located about 11 miles from the center of Montreal and about one mile from the large No. 1 mill of the Canada Cement Company. The plant has the advantage of street car service, city water and sewerage system. The plant is reached via Montreal Tramways and the Canadian National Railways. Local shipments can largely be taken care of by the former or by truck, while shipments to any distance will be made through the latter. The mill is also about 1½ miles from the St. Lawrence River and connected by rail with this so that water shipments can be made and also coal and gypsum brought in by steamers. The company plans to build its own dock in the near future. It may be well to call attention here to the fact



General view of the new plant of the National Cement Company at Montreal, P. Q., Canada


NATIONAL CEMENT COMPANY
MONTREAL EAST, QUEBEC, CANADA
GENERAL ARRANGEMENT OF PLANT
RICHARD K. MEADE & CO., ENGINEERS,
BALTIMORE, MD.
DRAWN R.J.R.
TRACED R.J.R.
CHECKED
APPROVED
DATE May 12-1926
SCALE 1" = 20'
REVISED
REVISED
Nº 140-161.
CLINKER STORAGE
100'-Span Electric Crane with 2 Cu Yd Bucket
Operators Cage
FUTURE CLINKER MILL
SHOP BUILDINGS ETC.
Laboratory
Supt. Office
Store House
Wash Room
Electric Shop
Machine Shop
FUTURE BAG STORAGE
FUTURE PACK HOUSE EXTENSION
Future Bridge
STOCK HOUSE
FUTURE STOCK HOUSE EXTENSION
Storage Bins
RAW AND CLINKER MILL
Raw Bins
Clinker Bins
Synchronous Motors
Clinker Dryer
Coal Dryer
Coal Storage Bins
Elevator
Firing Chamber
Stack Chamber
Coal Crusher
Track Hopper
Track At Grade
Belt Conveyor
Drive House
KILN BLDG. DISCHARGE END
9'x160' Rotary Kilns
ROTARY KILNS
FUTURE KILN BUILDINGS
NORTH AND SOUTH BASE LINE
KILN BLDG. FEED END
STACKS
BLENDING SILOS
TRANSFORMER BUILDING
TOWER
STONE STORAGE BUILDING
Tunnel And Belt Conveyor
HOIST BLDG.
FUTURE WASTE HEAT BUILDING
DRYER BUILDING
Stone Rotary Kilns
Hammer Mill
CRUSHER BUILDING
Traveling Crane
Crusher
Hopper
Compressor
QUARRY TRESTLE
R.R. TRACK EAST AND WEST BASE LINE
Concrete Intersection

that Montreal is the second greatest port in North America. The situation of the plant so far as terminal facilities go is, therefore, comparable to a mill located at, say, Jersey City or New York.

Quarry and Raw Material

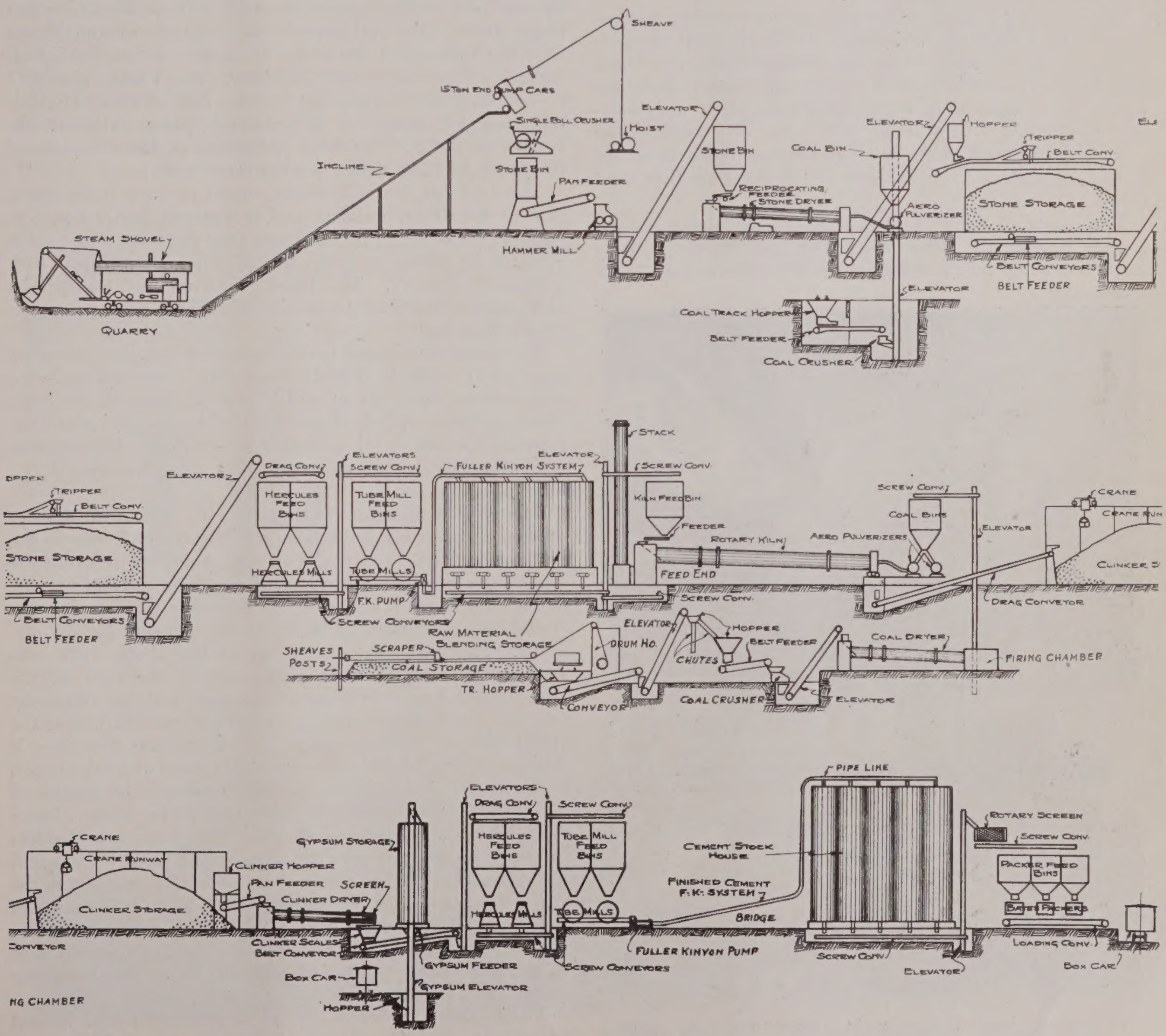
The raw material employed is the well known cement-rock found on the island of Montreal, which is pronounced by experts to be probably one of the most economical materials for the production of cement so far discovered. This material is quite similar in chemical composition to the famous cement-rock of the Lehigh district. It will be recalled, however, that it is generally necessary to mix some limestone with the Pennsylvania cement rock, whereas the percentage of carbonate of lime in the Montreal cement rock is sufficient and no additions have to be made to it for burning. The chemical analysis of the rock is shown by the following average analysis:

Silica	14.28 per cent
Iron oxide	1.82 per cent
Alumina	5.48 per cent
Carbonate of lime	75.39 per cent
Carbonate of magnesia	3.15 per cent

The quarry is located immediately adjacent to the mill and will be worked with a 45-ft. face, this depth giving a natural "mix." The drilling is done by means of a Sanderson Cyclone, Type 14, electric 6-in. traction well drill; the loading by means of a No. 50-B Bucyrus electric caterpillar shovel equipped with a 1¾-yd. dipper (Bucyrus Co., Bucyrus, O.). This shovel operates on D. C. current and is equipped with its own motor generator set. As the ledges of rock are nearly horizontal the quarry floor is very even and the rock "shoots" effectively. Secondary drilling is done by Jack-hammer drills. The rock is loaded in 15-ton end-dump cars, made by the Canadian Car & Foundry Company, Montreal, and hoisted up an incline to the mill. For a considerable time no engine or other means of transportation will be required in the quarry, the haulage being taken care of by the hoist in the stone house, which places the cars by gravity at the shovel.

Crushing Plant

The mill is a dry process plant, this process having proven in competent hands to be entirely satisfactory to produce cement of the highest quality and to do this more economically than the wet process. The dry process is



Flow sheet showing process employed and routing of materials through the plant. Because of severe climatic conditions, the dry process was considered most efficient particularly desirable in Canada owing to the high cost of fuel and the severe winters, which make slurry tanks liable to freeze unless heated artificially.

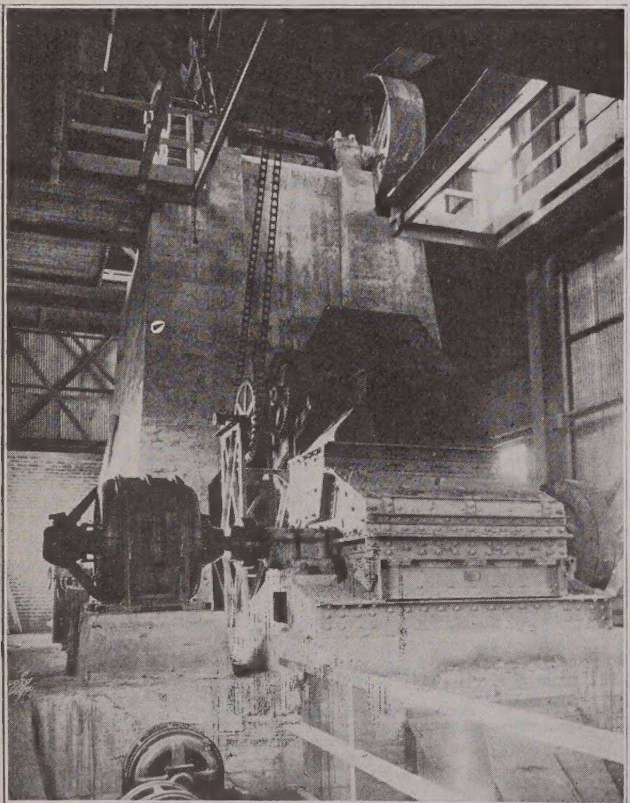
As stated, the rock is hauled from the quarry by means of a heavy duty single drum hoist 54 in. in diameter by 36 in. long, made by the S. Flory Manufacturing Company, Bangor, Pa. The hoist is operated by a 350-h.p. motor. The hoist is equipped with both motor brake and power brake and with a Royer over-winding and over-speeding device.

The hoist operator's cage is enclosed in glass and is located in the front of the crusher building. From it the operations in the quarry can be observed. It is also so placed that the hoist men can note the operation of the crusher. Push buttons are provided at strategic points by means of which the crushers can be stopped should this at any time be deemed necessary.

The cars are dumped automatically. As the car nears the dumping point, a pair of wide gauge wheels at the rear of the car engages a pair of rails placed outside and at a steeper incline from the main track, and so tilt the car. At the same time the bail attached to the cable pulls up, allowing the door to push open and the stone to be discharged into the crusher hopper.

The crushing is done in two stages. The primary crusher consists of a 36x60-in. Pennsylvania Single Roll Crusher (Pennsylvania Crusher Company, Philadelphia). This is belt-driven by a 200-h.p., 600 r.p.m. motor and is provided with a steel plate hopper protected with rails, with a receiving opening 7 ft. 4 in. by 9 ft. 5 in. The back shield is hinged and may be let down to form a platform to aid in making repairs. This crusher is set to crush 8 in. and under.

The material from the primary crusher drops into a hopper beneath the latter and is fed from this to the secondary crusher by an apron conveyor forming a feeder for the latter. The secondary crusher consists of a Pennsylvania hammer mill, size SX-12, which is driven direct connected by a 300-h.p., 750 r.p.m. motor. The hammer mill is set to crush 2 in. and under. The apron conveyor is driven from the crusher shaft by a belt. The crushing plant has a capacity of about 250 tons per hour and is designed to take care of the 6000-bbl. plant.



The crushing plant. At the top of the illustration is the primary crusher. In the foreground is the hammer mill for secondary crushing

An overhead, 10-ton, hand-operated crane, made by the Herbert Morris Crane Company, operates on a bridge above the crushers. The crane has a 40-ft. lift and a 28-ft. span. An extension of the bridge beam allows the trolley to move out over a track alongside of the crushing plant in order to facilitate removal of parts to the machine shop for repairs, etc.

Dryers

The material discharges directly from the hammer mill into a 42-in. incline bucket elevator, which carries it to the two bins above the dryers. This elevator is driven through a worm gear by a 24-h.p. motor.

There are two dryers each 6x70 ft. Each dryer has its own feed bin and each bin has a working capacity of about 150 tons. Material is fed from the bins into the dryers by a reciprocating table feeder. The dryers revolve at 3 r.p.m. and are heated by pulverized coal. Each dryer is driven by a 30-h.p. motor through a Hans Renold silent chain drive. The pulverized coal is prepared and blown into the furnace of the dryer by means of an Aero Pulverizer (Aero Pulverizer Company, New York), size "D"—one pulverizer furnishing coal for both dryers. The distribution by means of a deflecting plate valve at the branch of the Y. The Aero pulverizer is direct connected to a 40-h.p., 1200 r.p.m. wound rotor motor.

The coal for the pulverizers comes in on a track along side of the dryer building and is dumped into a concrete hopper. It is fed from the latter into the boot of a bucket elevator by means of a belt feeder which is equipped with a magnetic pulley. The latter takes out any tramp iron and protects the Aero pulverizer from damage.

Stone Storage

The stone storehouse is of reinforced concrete construction, 45 ft. wide by 150 ft. long and is divided into two longitudinal bins, one of which is to be emptied while the other is being filled. Each bin holds enough stone for three and a half days' operation of the mill. Dry stone is stored because of the danger of wet stone freezing in the bins in winter, etc.

The idea of this storehouse is to give a uniform quality of stone. Each bin holds about 3000 tons and, due to the method of filling and emptying, all stone drawn from the stonehouse is of practically uniform composition.

The dried rock is conveyed from the dryers into the stonehouse by means of a 36x18-in. inclined bucket elevator. The latter discharges on to two 24-in. belt conveyors each 160 ft. long, operating in the roof of the stonehouse. Each conveyor is equipped with an automatic tripper, which moves continuously back and forth over the full length of the stonehouse. By this means the stone is distributed uniformly over the whole surface of the latter.

The stone is drawn out of the stonehouse by means of two tunnels running lengthwise under the bins. These tunnels are each equipped with two automatic feeders mounted on small trucks which may be placed underneath any desired discharge spout of the bin. By this means the raw material can be fed automatically from two points in the bin. The feeders discharge on two 16-in. belt conveyors, one in each tunnel. Each conveyor is equipped with a magnetic head pulley to separate from the rock any tramp iron and so protect the grinding mills.

Each feeder is driven by an individual 2-h.p. wound rotor motor, which may be plugged in at suitable outlets on the tunnel walls. The two 24-in. belt conveyors overhead are each driven by a 7½-h.p. motor through shafting and belts. The two 16-in. reclaiming conveyors are driven by a 7½-h.p. motor.

Raw and Clinker Mill

The material from the stonehouse is elevated by means of a 24-in. incline continuous bucket elevator to the bins above the Bradley-Hercules Mills, the lateral conveying being done by means of a "Rex" drag chain.

The raw and clinker mills are located in one room. There are four Bradley-Hercules Mills (Bradley Pulverizer Company, Allentown, Pa.), each driven by a 350-h.p., 400 r.p.m. wound rotor motor, direct connected to the mill through a DeLaval coupling. Two Hercules Mills are designed for clinker grinding and two for the raw material. Arrangements have been made so that three mills can be operated on either raw material or clinker. Sixteen inch screw conveyors collect the material from the Hercules Mills and distribute this to the tube mill bins and the elevating is done by an 18x18x8½-in. double strand bucket elevator.

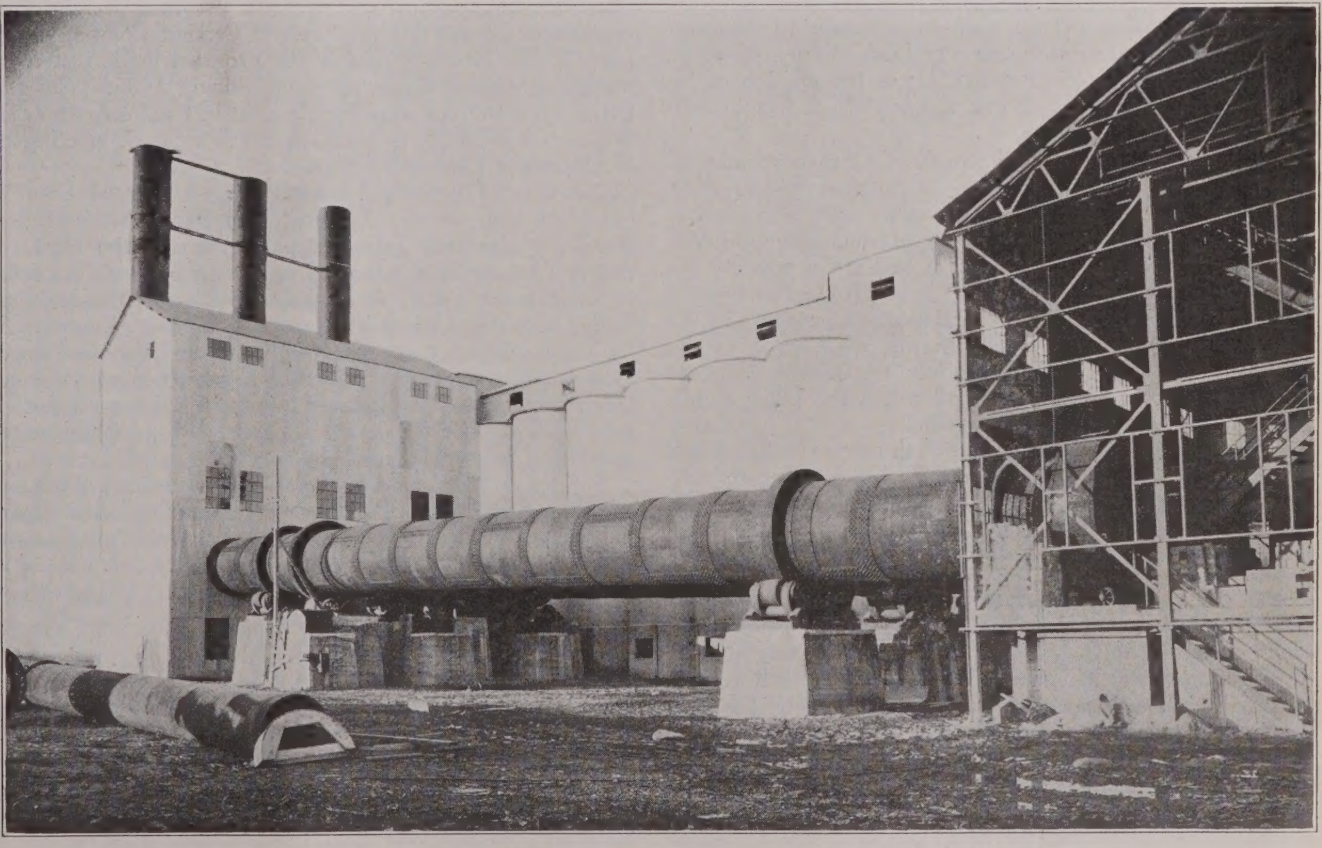
The final pulverization is done by single compartment tube mills. There are four 7x26-ft. tube mills charged with steel balls. These mills were made by the Canadian Vickers Company, Montreal, and the design is the joint product of Mr. Randall, the chief engineer of this company, and of Richard K. Meade & Co. A platform is placed over the mills to facilitate charging. Each tube mill is driven by a 500-h.p., 180 r.p.m. super-synchronous motor. No magnetic clutch is used. The motors are located in a room by themselves away from all dust and are, of course, provided with an exciter set and completely equipped panel board. These motors are employed to correct the power factor.

Blending Bins

The finely ground raw material from the two tube mills operating on this is collected in a short 16-in. screw conveyor and delivered to a Type B, 8-in. Fuller-Kinyon pump (Fuller-Lehigh Company, Fullerton, Pa.), which conveys it to six large reinforced concrete silos. Here its composition is checked and the ground material from several silos is blended if found necessary in order to give a uniform product. These silos take the place of the slurry tanks and agitators of the wet process, and make the dry process susceptible to the same close chemical control as the wet. Each silo is 15 ft. in diameter by 43 ft. in height, and holds approximately 170 tons of raw material. Material may be drawn out of the silos at any or all of four openings by means of feeders into a screw conveyor in the floor. By varying the number of openings from which material is drawn the proportions of the latter drawn from any silo may be regulated.

The material drawn from the silos is collected in a 16-in. screw conveyor and a similar conveyor distributes it in the kiln feed bins. The elevating is done by means of an 18x8x8½-in. double strand bucket elevator. The screw conveyors are employed here in place of a Fuller-Kinyon pump because it was felt that the mixing action of these was needed. Arrangements are made, however, to by-pass the silos if desired in case of an accident to the elevator and conveyor system and pump the material directly from the tube mills into the kiln feed bins.

The "mix" is made in the quarry, the rock being fairly regular in chemical composition. The designer of this mill, however, was not content to trust the quality of the product to this, but took occasion whenever the opportunity presented itself to provide means to insure the highest quality. Perhaps all chemists will agree that the best means to secure this is to have the ground raw material of correct and uniform chemical composition. It will be noted that uniformity of the composition is secured, first, by employing a large stone storage equipped with distributing conveyors, next by the use of large blending bins for the ground raw material and finally the clinker, as will be



Three 9 x 160 foot kilns are installed. Only the ends of the kilns are housed in. Paralleling the kilns to the right are the blending silos seen, is itself blended. Results obtained after four months' operation have demonstrated fully the effectiveness of these steps to give a uniform cement.

Kilns

There are three two-tire rotary kilns each 9x160 ft. These kilns were made by the Vulcan Iron Works, Wilkes-Barre, Pa. The kilns are pitched at ½ in. to the foot. The two ends are housed, but there is no building over the middle of the kilns. Each kiln is operated by a 50-h.p. constant speed motor, which is housed in a small steel house. The connection between the motor and the kiln is by means of a silent chain drive. The raw material is fed out of the bins into the kiln by means of a special worm feed, the latter being driven by a 7½-h.p. variable speed motor. It will thus be seen that the kilns themselves revolve at a constant speed, but the feed can be varied at will to suit the burning. Each kiln is provided with a reinforced concrete dust chamber and a 7x90-ft. steel stack. The dust chamber is lined with fire brick, with a layer of sil-o-cel brick between the concrete and the fire brick. An opening has been left in the rear concrete wall which is now closed by brick work, but which can be opened at any time for connection with a waste heat boiler installation. A 16-in. screw conveyor runs in front of the stack chamber and conveys the material removed from these to the elevator to the feed bins. The kilns are lined with brick made by the A. P. Green Fire Brick Company, St. Louis, Mo.

(To Be Concluded in the August Issue)

The Cement Industry in Germany During 1925

By E. LEE HEIDENREICH

During the first winter months 1924-1925, it became evident that an increase in the cement production of Germany would be required to meet the coming demands of both cities and the government.

It became more and more necessary to fill in the neglected construction program, delayed by war and post-war conditions. Actually, the production during 1925 amounted to 85 per cent more than that of the last pre-war year, 1913.

This, however, does not mean a corresponding increase of cement plants—as during the twelve years—improvements and economical changes greatly have increased the efficiency in production of the individual plants.

The foreign demand, which is so exceedingly important for the German cement industry, is ever subject to the fluctuating cement prices, and when those abroad approach the German minimum standards, these standards will have to be cut, to meet the Dawes proposition of increasing our exports. Our prices, due to high freight conditions, must be cut down.

While the inland demand for the first nine months of 1925 has been exceptionally good, a notable reduction has taken place during October, November and December—even more so than due to the decrease in construction during the winter—and possibly due to the uncertainty regarding the stock on hand by the syndicated sales beyond December 31, 1925. The promotion of skyscrapers in the cities and large public works in the West, such as the Lippe-Datteln canal, and in Hanover, the Mittelland canal will cause a considerable demand, when the labor conditions permit this work to be started.

The gradual stabilizing of the bank systems will permit an expansion of private undertakings, which naturally will have a salutary influence over the production of 1926.

—*From Tonindustrie-Zeitung.*

Batesville, Ark.—The Batesville Cement Company, organized and incorporated last November, exercised its options on approximately 1,000 acres of mineral land, rich in limestone deposits, located about 5 miles northwest of Batesville. The local company is controlled by the Missouri Portland Cement Company of St. Louis, Mo. Core drilling tests on the land were recently completed and disclosed a high average of limestone and shale admirably adapted for cement manufacture. It is reported that a large cement plant and the development of the limestone deposits will be undertaken this summer.

Enthusiastic Annual Safety Meeting Held in Lehigh Valley District

More than two hundred representatives of fifteen cement companies of the Lehigh Valley district met in Phillipsburg, N. J., for their eighth annual safety meeting under the auspices of the Portland Cement Association. If this meeting was any indication of the enthusiasm prevailing in cement plant safety meetings throughout the industry, the reason for the high standing of the industry in safety work is easily understood. Not merely theorists and safety executives but men direct from the mills in whose hands lies the putting into effect of the safety principles and practices, got up on their feet and told the crowd just how they did it. To Mr. H. G. Jacobsen of the Portland Cement Association belongs the lion's share of the credit for getting the workers in the cement plants so solidly behind the safety movement.

Mr. Jacobsen was the first speaker on a tremendously interesting and enthusiastic program presided over by Russel Frame, of the Alpha Portland Cement Company. In his talk Mr. Jacobsen told of the progress made in the industry in cutting down accidents during 1925. The statistics used by him were reported in last month's story of the award of safety trophies at the New York meeting of the Portland Cement Association.

Other talks included addresses by Dr. Paul Correll, chief surgeon of the Easton (Pa.) Hospital, and Mr. Roach, of the New Jersey Department of Labor and Industry. An important feature of the session was the talks by representatives of the Canada Portland Cement Company and the Universal Portland Cement Company—the two plants that won the trophies for an entire year of freedom from accidents. These men came direct from the no-accident plants to tell their stories to the other mill workers at the meeting. There were no frills, but a great deal of "brass tack" sound advice.

Supper and a good time followed the serious afternoon meeting. Mr. Morris Fortuin, works manager of the Pennsylvania Portland Cement Company, was the toastmaster.

The work of lengthening the kilns of the Ash Grove Lime and Cement Company's cement plant at Chanute, Kansas, which was started last July, has been completed and the kilns are now in operation. The five kilns were increased from 125 to 180 feet in length and provide an increase of 25 per cent over the previous capacity of 1,250,000 barrels annually. Although these kilns were practically rebuilt, the plant has been in continuous operation and was only shut down for a brief period to make the necessary connections with the concrete stack which is over 300 feet high.

Slag Cement Manufacture

An Abstract of an Article by Dr. Richard Grun in the *Deutsche Bergwerks Zeitung*—Properties of Slag—Types of Slag Cements—Metallurgic Cement—Iron Portland Cement — Blast Furnace Cements — Chemical Proportions—Methods of Manufacture

IN the manufacture of steel large quantities of blast furnace slags are produced as a by-product. They vary in quantity from ½ to 1½ pounds of slag per pound of steel produced. Only 50 years ago no one knew of any use for this cumbersome by-product, and nothing was done with it. Naturally efforts were made from the first to try to find some use for this by-product, but it was only recently that discoveries showed a practical use for slag. At first slag served only as surfacing material for roads, following that it was used in the manufacture of artificial stone, and more recently there has been developed the idea of putting its hydraulic properties to use—long since known—in the manufacture of cement. This industry has had considerable development recently. As a matter of fact the quantity of slag which is treated for use in cement manufacture is steadily increasing.

Blast furnace slags have a composition which is very similar to that of portland cement. Like cement, they are composed chiefly of lime, silica and alumina, but they are distinguished by the fact that they contain considerable less lime. Because of this close relationship to portland cement, blast furnace slags naturally possess considerable hydraulic properties. But there is this difference: portland cements hydraulize and set as soon as they are brought into contact with water, whereas the hydraulic properties of blast furnace slags are latent. That is to say, the setting and hardening of slag requires the aid of some material which acts as a catalyst. The catalyst employed can be either slacked lime or portland cement.

In the former case the lime and the slag are ground together and the resulting product is properly called slag cement (Schlackenzement).

If the clinker of portland cement is employed as the catalyst, there is produced what the Germans call metallurgic cement (Huttenzemente). Differentiating more closely according to the relative proportion of slag and portland cement which enters into the composition of the cement in question, we have either iron portland cement (Eisenportlandzement) or blast furnace cement (Hochofenzement).

As slag, there should be employed only that which presents the proper composition. The slags of foundries and those coming from factories where steel is made by the treatment of hemitites are particularly recommended. The slag used should be one that is cooled quickly immediately upon coming from the furnace, for slag does not conserve its hydraulic properties unless it is quickly chilled, and by that method solidified into the form of an amorphous mass which has not had time to crystallize.

Types of Slag Cement

Three cements, constituted in the following manner, are made:

(a) Slag cement—a mixture of about ten parts of slacked lime and ninety parts of granulated blast furnace slag.
(b) Iron portland cement—a mixture of about 70 parts of portland cement to 30 parts of granulated blast furnace slag.
(c) Blast furnace cements—a mixture of from 15 to 50 parts of portland cement clinker and from 85 to 50 parts of granulated blast furnace slag.

In order to regulate the time of setting and to increase the strength there should be added to these different mixtures about 2 per cent of gypsum.

The portland cement clinkers mentioned above are obtained from blast furnace slag and limestone, which are mixed together in proper proportions, ground, and then burned after the ordinary method. The blast furnace slag contains in the neighborhood of 45 to 50 per cent of lime, whereas the clinker of portland cement contains about 65 per cent.

These figures will enable one to determine the proportion in which it is necessary to mix the slag and limestone preparatory to the production of portland cement clinker. It is necessary in order to do so to know the exact composition of the slag and of the limestone which is to be used.

Naturally it is possible to use directly a portland cement prepared by the manner indicated above. This method of procedure is not always followed because of its high cost. It is easily seen that it is less expensive to transform by burning only a part of the slag, and to use the remaining part without any transformation. However, the manufacture of true slag cement is not general in Germany, for the metallurgic cements (iron portland cement and blast furnace cement) are much superior to the slag cement from the standpoint of uniformity and strength. In a circular appearing in 1916 iron portland cement was put in the same class as portland cement, and in 1917 blast furnace cement was also admitted as equivalent to portland cement. These two cements were accepted on an equal basis with portland cement, however, only after a long series of tests of the material in service.

The granulation necessary to bring out the hydraulic properties of slag is brought about either by air or by water or by the two combined. What is called "dry granulation" is brought about by the Buderus process. It employs but a small quantity of water and is particularly adaptable to slag high in silica. A process which employs at the same time both air and water is that of Opterbeck. In this process the slag falls, together with a small stream of water, onto a circular table equipped with grooves and ridges. The table turns very rapidly and shatters the slag into an infinity of minute particles, permitting the water to penetrate into the mass of the slag. The process of Opterbeck produces grains of slag which contain but a very small portion of water in their pores.

In most plants granulation is attained by water. It is accomplished simply by the ordinary method of permitting the slag to flow into a trench or trough filled with water. It is so arranged that the slag is immediately immersed in the water upon its emission from the furnace. In this way the most rapid and intensive cooling is possible.

Slags so granulated contain a large portion of water (20 to 40 per cent). It is necessary that this be eliminated before the slag is used. Slags poor in lime (called long slag) contain more water than those rich in lime (short slags).

After the slag passes through the water it is dried by traversing a horizontal, revolving drum at one of the extremities of which there is introduced a flame of blast furnace gas, of coke gas, or simply of coal.

Preparation of Clinker

Clinker is prepared by mixing blast furnace slag and limestone. The slag and limestone are ground together after having been mixed in proportions determined by laboratory examination. In general, the properties are around 1 part of slag for 1 1/10 to 1 3/10 parts of limestone. The powder so obtained must then pass through a rotary kiln slightly inclined. In the kiln the limestone decomposes, the carbonic acid is driven off, and the lime enters into combination with the slag to form the portland cement clinker. The clinker then leaves the kiln and passes through the coolers, then to the silos and to the grinding mills.

In place of burning it in rotary kilns, the clinker can also be made by using ordinary chamber kilns. In this case the powder is molded in the form of briquettes, which are a mixture of the slag and pulverized clinker with coke and a little water. After these briquettes are hardened sufficiently to permit transportation, they are placed in the kilns. These kilns are a sort of tower 30 or 40 feet high with walls of stone or refractory brick. In these the briquettes of slag and coke are burned. Combustion results in a reaction similar to that in the rotary kiln. It is then forced through a fixed grill which is in contact with another grill that moves slowly backward and forward. This acts as a partial grinding medium which reduces the clinker to reasonably small particles. These are then transferred to the regular cement grinding mills.

It should be noted that in the preparation of portland cement clinker it is possible to employ slag which has been crystallized by slow cooling as well as amorphous slag obtained by rapid cooling.

Preparation of Metallurgic Cement

The clinker obtained as indicated is mixed with blast furnace slag which has been granulated and the two are ground together to obtain metallurgic cement. A typical mix would be about 68 parts of slag, 30 parts of clinker and two parts of gypsum, the entire giving 100 parts of blast furnace cement. Grinding is effected in either ordinary cylindrical grinders or in special grinders which employ a preliminary chamber in which the materials acquire a certain degree of fineness, about that of ordinary gravel. In the grinding chamber proper the steel balls reduce the cement to the fineness of flour, so that only 5 per cent of it will be retained upon a screen of 5,000 meshes.

Recently a third grinding chamber has been added as a method of arriving at the very greatest possible fineness in cement. This is done in order to give a cement of particularly high strength.

The production and development of metallurgic cement has not increased rapidly except in the last few years. This is a particularly favorable circumstance from an economic point of view, for in the production of metallurgic cement the burning and grinding does not ordinarily require a direct use of coal, the necessary heat obtained being waste heat from the metal working establishment using the blast furnaces. The mechanical strength obtained in metallurgic cement is practically the same as that found in portland cement, and the metallurgic cement presents the added advantage of a higher resistance to the action of sea water. The blast furnace cement contains in the neighborhood of 53 per cent lime as against approximately 65 per cent for portland cement. Sea water attacks concrete which contains free lime aggressively, combining with it soluble compounds, and disintegrating the concrete. The blast furnace cements, because of their relatively low lime contents, contain practically no free lime. There is therefore much less chance of their being attacked by sea water than ordinary portland cement, which often contains free lime in considerable quantities.

Research

Two and one-half years ago the German Association of Blast Furnace Cement Manufacturers and the German Association of Manufacturers of Portland Cement joined in founding at Dusseldorf the "Research Institute of the Metallurgic Cement Industry." This institute has for its purpose the testing and proving of all slags and metallurgic cements which are found in commerce. Above all things it has been occupied—and continues to be occupied—with researches relative to blast furnace slag, of its various applications and the proper methods of using it, of methods which can be devised to improve its qualities, and the development of new uses, etc.

New Safety Record Set

The Martin's Creek No. 3 plant, in completing one year without having a lost time injury among their 250 employees, set up a new safety record for the Alpha Portland Cement Company. The coveted honors were reached at the end of the 365th day on May 26, 1926.

The good work of their safety committee is best illustrated by the following comparison:

1919	69 accidents
1920	74 accidents
1921	41 accidents
1922	58 accidents
1923	66 accidents
1924	36 accidents
January to May, 1925	7 accidents
June, 1925, to May, 1926	0 accidents

Dr. Budd J. Reaser, who has handled the two Alpha plants at Martin's Creek, Pa., for the past 15 years, is being congratulated, too, for his careful and efficient attention to the minor injuries by which he has kept down the infections and thereby prevented lost time from this source.

In recognition of their efforts to reduce accidents, a $5 bill was presented to each employee and engraved watch charms bearing the Alpha safety emblem were distributed to the safety committee and foremen. Vice President F. G. McKelvy, General Superintendent N. D. Colburn, Division Engineer H. Hanks, Plant Superintendent J. L. White, made addresses at a meeting of the employees commending them for their interest and cooperation to reduce accidents and urging them to surpass the present cement plant safety record within the Portland Cement Association membership, which is 542 days without a lost time accident.

The Alpha management is strongly upholding the campaign to make their plants safer places for the workmen and offers to pay a bonus equal to 1 per cent of the payroll to the men, who go an entire month without a lost time accident during the period from May to December, 1926. During May seven of the nine Alpha plants were eligible for the prize money in amount $2,400 by having clear accident records.

While it is generally supposed that every one should be sufficiently interested in his own welfare to be careful about his work and to avoid personal injuries, yet the Alpha company believes in paying their employees to take care of themselves.

International Trade in Portland Cement in 1925

An abstract of a special bulletin by J. S. McGrath of the Bureau of Foreign and Domestic Commerce, Department of Commerce—Tables of Imports

From a statistical point of view, the year 1925 was the most prosperous in the annals of the American portland cement industry. Preliminary figures released by the Department of Commerce covering domestic production and shipments indicate an appreciable increase over previous years. For five consecutive years—1920 to 1924, inclusive—exports of American cements diminished annually. But in 1925, foreign sales of American manufactured portland cement increased approximately 16 per cent as compared with 1924 exports.

The tremendous construction activities of 1925 caused an unusually heavy demand for cement. They called for a capacity output of American cements and in addition absorbed a vast increase in imports of foreign cements. Imports of portland cement into the United States during 1925 increased approximately 82 per cent over 1924 imports. The ability of European cement manufacturers to underquote American producers on "delivered port" shipments consigned to Atlantic, Gulf and Pacific coast markets is the principal reason for our constantly increasing importation of cement. Canada, also, is coming to the fore as a foreign source of supply for northern New England and New York markets.

Of all sections affected by the imported product, the Customs District of Florida was the most outstanding market during 1925. The Florida market alone consumed approximately 27 per cent of the total quantity of cement imported during the year. Florida's imports during 1925 showed an increase of approximately 698 per cent or 851,230 barrels over 1924 imports.

Table No. 1 presents a comparative summary of portland cement production in the United States during the past five years.

Table No. 1

YEAR	ACTIVE PLANTS	PRODUCTION Bbls.376 lbs.	SHIPMENTS Bbls.376 lbs.	TOTAL IMPORTS Bbls. 376 lbs.	TOTAL EXPORTS Bbls. 376 lbs.
1921	105	98,842,049	95,507,147	122,317	1,181,014
1922	118	114,789,984	117,701,216	323,823	1,127,845
1923	126	137,460,238	135,912,118	1,678,636	1,001,688
1924	132	148,859,000	145,747,000	2,010,936	878,543
1925	138	161,298,000*	156,721,000	3,656,085**	1,019,597**

* Prepared by Bureau of Mines as preliminary figures.
** Subject to revision.

The relatively low ocean freight rates accorded European cement consigned to American markets places the product at an advantage as compared with American cement *in coastal markets only.*

Imports from Europe

Imports from Belgium head the list. In 1924 there were 1,018,426 barrels of cement, valued at $1,577,793 imported. This was increased in 1925 to 1,911,745 barrels valued at $2,984,283.

Norway sent 525,590 barrels of cement into the United States in 1924 and increased this to 593,630 barrels, valued at $1,041,868 in 1925. Most of this was consigned to the Los Angeles and Hawaii custom districts.

Practically all of the cement exported from Denmark to United States customs district was sent to Porto Rico. In 1925 Denmark sent 351,484 barrels of cement to America. This exceeded the previous year's figure by about 40,000 barrels.

Shipments totaling 33,690 barrels of cement were sent from Esthonia to Hawaii during 1925.

Shipments from the United Kingdom (except Canada) show a decrease in 1925 to 6,159 barrels. Imports in 1924 totaled 28,852 barrels.

Exports from Germany to the United States increased slightly during 1925. Practically all of the 17,681 barrels imported during that year were received at New Orleans.

France increased its exports to the United States from 5,451 barrels in 1924 to 19,946 barrels in 1925. While the annual output of cement in France has steadily increased under the stimulus of reconstruction needs, the production capacity of French portland cement mills is still well in excess of the country's present domestic and foreign requirements. On export consignments, a special railway discount of 10 per cent is allowed for shipments of lime and cement. This reduction is increased to 25 per cent provided the distance covered or paid for equals or exceeds 50 kilometers.

Imports from Switzerland, Italy and Spain have never exceeded a few barrels and in 1925 they were discontinued entirely.

Table No. 2

IMPORTS OF ROMAN, PORTLAND, & OTHER HYDRAULIC CEMENT BY CUSTOMS DISTRICTS
(In Barrels of 376 Pounds)

CUSTOMS DISTRICTS	1924	1925
Maine & New Hampshire	3,324	32,492
Massachusetts	58,216	321,256
St. Lawrence	3,837	357,626
New York	75,046	15,854
Philadelphia	167,654	282,365
South Carolina	10,580	45,866
Florida	121,836	973,066
New Orleans	93,294*	157,728
Mobile	---	41,684
Los Angeles	613,605	370,130
San Francisco	106,865	131,427
Washington	126,512	169,412
Hawaii	226,556	197,871
Porto Rico	333,230	318,134
Galveston	12	---
Oregon	34,094	116,009
Vermont	27,237	54,379
Rochester	2,580	9,258
Buffalo	6,458	60,319
Virginia	---	1,150
Dakota	---	60
TOTAL	2,010,936	3,656,085

Imports from Other Countries

Canada has made the greatest increase in its exports to the United States. In 1924 Canada exported only 42,953 barrels of cement, while in 1925 Canadian exports totaled 711,050 barrels. Of all countries exporting cement to the United States, this record is exceeded only by Belgium.

About 10,000 barrels of cement were imported from Japan during 1925 and small quantities were received from Cuba and Mexico.

The Cost of Low Power Factor

By C. H. SONNTAG

(Concluded from June issue)

the substitution of a synchronous for an induction motor, the power factor is raised to unity, the transformer will be able to carry a useful load of 587 KW. Hence it is seen to be generally true that improving the power factor of the load of a transformer automatically raises, in the same ratio, the amount of real power that it will handle.

For the sake of simplicity, the figures just presented have been based on the use of a single phase transformer. They will not be greatly different if one three phase unit is considered, but if the 440 KW. is to be carried by three single phase transformers the penalty for low power factor will be greater, because the smaller units will cost more per KVA.

(e) Voltage Drop at the Ends of Lines

In a direct current system the drop in voltage from the generating to the distant end of a line is directly proportional to the power loss. In an alternating current circuit the relations are not so simple, and the loss in voltage may be considered to be made up of two parts:

(1) The resistance drop, which depends on the number of amperes flowing and the material of which the conductor is made, is similar to the drop in a direct current circuit.

(2) The reactance drop, which depends on the size of the current in amperes, the number of alternations per second and the distance between the conductors of the circuit. It is less the closer the wires are together, and is the result of the rapidly alternating magnetic field built up around the conductor. It does not represent a loss of energy.

The total drop in the line is not the arithmetical sum of the resistance and reactance drops. The relations between them are not simple, and the total is best found from charts prepared for the purpose. In a line carrying a heavy current the reactance is usually several times the resistance drop. Using the circuit already spoken of under (c), the resistance drop is about 2 per cent and the reactance drop about 8 per cent, but the total drop is only 7 per cent, which on a 440 volt line would be 31 volts. This means that the generator would have to be run at 471 volts to deliver a pressure of 440 volts at the end of the line.

Now both of these drops and their resultant, which is the actual loss of voltage, vary with the current, but not in a simple ratio. If the power factor had been 100 per cent, the current would have been 80 per cent of the value given, or 736 amperes. At unity power factor the influence of the reactance drop on the actual voltage loss almost vanishes for cases like the one we are considering, and in this particular instance the voltage loss at 100 per cent power factor for the same loss in kilowatts would be only 1.7 per cent, which would amount to $440 \times .017 = 7.48$ volts as compared to the original drop of 31 volts, or a gain of 23.5 volts. This may not seem great, but it should be borne in mind that the starting and maximum running torques of an induction motor vary inversely as the square of the voltage, and the current drawn by such a motor running under constant load varies almost inversely as the voltage, and so it is important to keep the pressure at the terminals of fully loaded motors up to normal.

The facts just brought out apply particularly to short lines at moderate voltage carrying heavy currents on conductors placed close together. They do not apply without modification to long high tension circuits with wires spaced several feet apart.

In this discussion no attempt has been made to bring out every item that is affected by low power factor, since it was desired to emphasize the financial rather than the scientific side of the question. It is apparent, however, that improvement in power factor is worth a careful analysis, since it may and probably will result in an actual increase in earnings.

New Concrete Deep Water Jetty

By A. C. BLACKALL

The Bevans works of the Associated Portland Cement Manufacturers at Northfleet (England) is being remodelled and enlarged and a reinforced concrete island jetty 60 ft. long by 41 ft. wide is being constructed to provide berthage for steamships up to 8,000 tons at all states of the tide. Particulars of this jetty are decidedly interesting.

It will stand out of the river entirely clear of the wharf side, with a dredged berth on the river side giving a maximum of 27 ft. of water at low tide for the accommodation of large vessels, and barge berths on the landward side. The height of the decking above the dredged level will be 53 ft., and provision for the rapid and economical handling of cargoes will be made by the installation of the latest type of cranes.

Nearly 50,000 cu. yd. of dredging, largely in solid chalk, has been done to prepare the site for the new structure which, situated at a particularly exposed point on the fast-running Thames tideway, embodies some features of special interest.

The jetty has been designed to secure maximum lateral stability with a minimum of reinforced concrete trestles, each comprising six piles, four of which are raking piles, at a slope of approximately three to one, and constitute two A frames side by side; the center of the A frames will be along the center line of the jetty, and the two remaining piles of each trestle will be vertical, being intended to support the crane girders running along each side of the structure. The only reinforced concrete work to be executed in situ below high water mark will be a brace slab built around the piles after driving, about 4 ft. above low water level.

Owing to the considerable difference between the dredged level of the deep water berths on the river side and the barge berths on the landward side of the jetty, the latter will be retained by a wall composed of large slabs of reinforced concrete, 9 in. thick, weighing some 12 tons each and planted vertically against and taking their bearing on the face piles on the landward side. The piles and other parts of the construction will be prepared with "ferrocrete" cement, the rapid hardening qualities and high strength of this cement being of considerable value in such work as this, which has to be completed in a very short contract time. The specification provides that piles may be driven, or shuttering removed from the beams, seven days after moulding.

The work is being carried out to the design of the company's chief engineer, in collaboration with Dr. Oscar Faber, and the contractors are A. Jackman & Son, of Slough.

Roslyn B. Fortuin, son of Marvis Fortuin, Mill Manager of the Pennsylvania Portland Cement Company's plant at Bath, Pa., has completed his preliminary work on a study of "The Layout and Operation of the General Stores of the Pennsylvania Cement Company." This study is being made for the Research Department of the Wharton School of Finance and Commerce of the University of Pennsylvania.

Meet to Improve the Lime Industry

Lime Producers Get Together at French Lick to Discuss Business, Technical and Promotional Problems—Decided Advancement Made During Past Year—Executive Sessions and Round Table Discussions Result in Much Good—What They Talked About.

The right kind of competition as a substitute for the disastrous sort that results in financial loss to any industry, and that can only come from strong associational activity, is bound to develop in the lime industry if the annual conventions of the lime producers become increasingly effective as they have in the past. Take the annual meeting just held in French Lick, for instance. Here, as they have probably never done before, the producers of lime got together on a friendly basis and immediately came down to brass tacks. Not only were the usual, the interesting, and the valuable technical papers given attention, but round table and executive sessions brought out a great many factors that have been retarding the growth of the industry. Frank and open discussion no doubt resulted in each producer more fully appreciating the viewpoints of the other fellow, and this attitude promises to have a salutary effect upon the industry.—The Editors.

A bigger, a better, and a more successful convention—a convention more than ever before conducive to the good of the industry—was experienced when the lime producers met last month at French Lick Springs, Indiana. The outstanding feature of the entire convention was the obvious willingness and desire of every producer to face conditions foursquare, discuss the things that were hurting business, and to take the necessary action to eliminate, as far as possible, the various difficulties.

Some very surprising ideas were expressed in two papers presented before the convention. W. E. Carson, president of the Riverton Lime Company, started an all-day discussion by a very critical paper entitled "What Is Wrong with the Lime Industry?" wherein he summarized conditions and said a great many things that resulted in a spirited discussion by practically every member present. This matter proved of such importance that it was given the entire day.

The morning session on Tuesday, the first day of the convention, was devoted to registration and the first half of the directors' meeting. During the afternoon session various committees were appointed, and B. A. Ford, secretary of the association, presented the report of the Maxet Bureau, of which he is manager.

Round Table

The Tuesday evening session was devoted to a round table discussion on lime manufacturing problems, while another round table discussion on the uses of lime was held Thursday evening. Professors Haslam of Massachusetts Institute of Technology, Withrow of Ohio State University, and McIntire of the University of Tennessee, were active in these discussions. Professor Haslam, presiding, opened the discussion the first evening with an explanation of the National Lime Association fellowship work carried on at his university. He then discussed the rate of solubility of gases in milk of lime suspension, the rate with which heat will penetrate limestone, and the effect of temperatures of burning on the plasticity of lime.

Victor J. Azbe, of St. Louis, then discussed the heat distribution in lime kilns. He first called attention to the fact that the average lime kiln is very inefficient, and that, as a rule, almost 70 per cent of the heat is lost in some way. Some of this waste is known, he said, to be preventable, but that other parts are considered as a hopeless loss. As is known, in lime kilns only the heat at high temperatures, above the decomposition temperature of the stone, is available for making lime, and all the heat below these temperatures can be used only in preheating the stone. This heat, however, is usually available in greater amount than is necessary, and there is a consequent loss through the kiln top. This loss is said to be about 30 per cent of the total heat from the fuel. This heat supply is generally too low in temperature and too fluctuating to be useful for recuperator or waste heat boiler purposes. Mr. Azbe, however, presented a theoretical design that should give far higher efficiencies, provided that such a kiln could be constructed. Since such might prove impossible, however, it is likely that certain principles involved might be adapted in lime plants to afford a nearer approach to the efficient kiln.

A Housing Development

The Wednesday morning session was opened with a paper by Irving G. Fellner, business manager of the McGraw-Hill Publishing Company, who discussed the marketing of chemical lime by methods of technical approach and on a quality basis. He was followed by J. P. Mollenkof, superintendent of construction, with John H. McClatchy, Philadelphia. He described the housing developments of that organization and showed the lime producers how his firm has advanced the use of lime without the cooperation of the association, and inspired his auditors to a program of active promotion. The McClatchy organization uses lime for all mortar, plaster and stucco work, delivering the prepared material to the jobs from a central mixing plant. Balanced publicity was then discussed by R. P. Brown, publicity manager of the association.

Publicity for such a large and diversified industry as the lime industry, claimed Mr. Brown, must be carefully balanced as to type of material, subject matter, readers, departments in the association, and between the association and its members. The function of the National Lime Association, he said, is to assemble data, work it into form, and make it available to the public. This may be through bulletins, articles, folders, films, news sheets and press releases. The bulletin is the most important, and the semitechnical bulletin may be considered the backbone of the whole program, for from it may be prepared all the other types of publicity. Since lime is used in a great variety of markets, the publicity must reach all classes of readers, and in such a form as to be acceptable to each group and available in such a form as to be of the greatest service to the greatest number. The final balance must be achieved through the cooperation of the member companies and the association in distributing literature, the members handling all the material that goes to the individual prospective purchasers, and the association sending out the purely technical material, together with news releases and similar material that is to be generally broadcast.

Structural Uses

The next matter taken up was a paper presented by J. S. Elwell, manager of the construction department of the association, entitled "There Is No Substitute." He outlined the qualities of lime stucco, lime plaster and lime as an admixture in concrete, dwelling upon the idea that great satisfaction is obtained by the use of the material, at a very favorable cost. The portion of his paper relating to the use of lime as an admixture was particularly interesting, since he showed how the contractor, by using lime, could handle a concrete that is workable without a sacrifice of strength, and produce work that has the best appearance. In the discussion that followed this paper, K. J. Zink of Kansas City backed up Mr. Elwell's statements with observations of his own.

The great market and service opportunities open to the lime industry in the industrial field were discussed by L. B. Burt, manager of the industrial department of the association, in a paper entitled "Opportunities in the Industrial Field."

As stated before the entire day Thursday was given over to a discussion of the things that are wrong with the lime industry. The only other events of the day were a directors' meeting and a round table discussion centered around the uses of lime. Three papers scheduled for presentation on Thursday afternoon were dropped. These papers, prepared by members of the association staff, were to have covered the topics, "'Lime in Concrete Highway Construction," "Lime in Earth Roads," and "The Practical Aspects of Research."

The Social Side

Conventions of the National Lime Association are famed for their social side, and this last convention was no exception to the rule. Tuesday evening saw a bridge party that proved very entertaining, while the banquet held Wednesday evening, where an unusual entertainment staged by the Bates Valve Bag Company of America, gave the producers another opportunity to renew old friendships and establish new ones. A golf tournament was carried on, which lasted throughout the entire time of the convention, while tennis and quoit tournaments were also held for those not interested in chasing the little white ball around the pasture. Adjournment followed a luncheon on Friday, June 11. Charles Warner continues as president and J. J. Urschel as vice-president for the coming year, and the only changes in the officers of the association were in a few directors' positions.

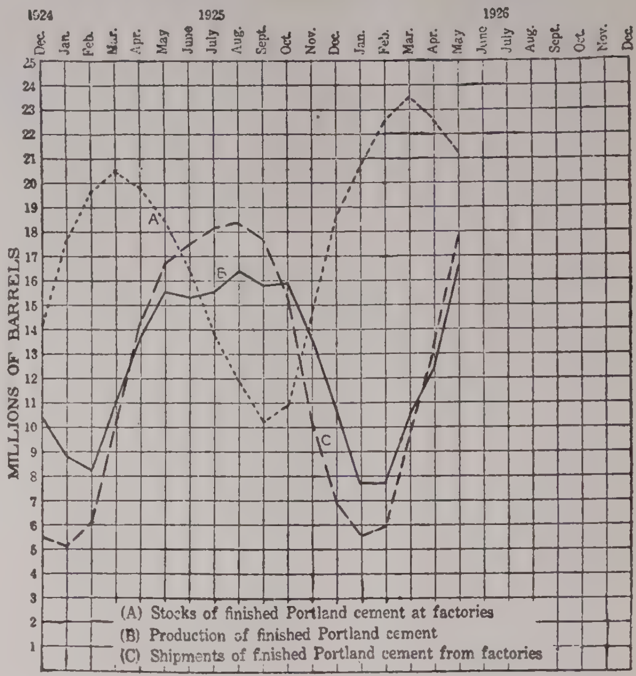
George W. Nast Dies in Accident

George W. Nast, general manager of the Western Lime & Cement Company of Milwaukee, and Ferd Mumm, plant superintendent, met their death while driving in the northern part of Wisconsin, June 11, on their way to inspect some timber land.

Their car was struck by a Soo Line freight train at a crossing in a cut. The car was tossed up on a bank from which it rolled back to be struck again by the cars. Mr. Mumm died instantly while Mr. Nast lived for a short time longer.

Both men were held in highest regard in the lime industry and their death comes as a severe shock to everyone who knew them.

Cement Statistics for May, 1926



Production, shipments, and stocks of finished Portland cement, by districts, in May, 1925 and 1926, and stocks in April, 1926, in barrels.

Commercial District	Production May 1925	Production May 1926	Shipments May 1925	Shipments May 1926	Stocks at end of May 1925	Stocks at end of May 1926	Stocks at end of April, 1926
Eastern Pa., N.J., & Md.	3,660,000	3,939,000	4,125,000	4,620,000	4,106,000	4,630,000	5,311,000
New York	838,000	861,000	907,000	928,000	1,164,000	1,418,000	a1,485,000
Ohio, Western Pa. & W. Va.	1,540,000	1,781,000	1,590,000	1,886,000	1,966,000	2,616,000	2,721,000
Mich.	1,120,000	1,289,000	1,201,000	1,301,000	1,245,000	1,920,000	1,932,000
Wis., Ill. Ind. & Ky.	2,400,000	b2,255,000	2,586,000	b2,618,000	3,218,000	b3,454,000	3,817,000
Va., Tenn., Ala. & Ga.	1,162,000	1,418,000	1,233,000	1,420,000	611,000	1,057,000	1,059,000
Eastern Mo., Ia. Minn. & S. Dak.	1,552,000	1,518,000	1,714,000	1,777,000	3,067,000	2,819,000	3,078,000
Western Mo., Neb. Kans. & Okla.	1,130,000	1,116,000	1,169,000	1,130,000	1,558,000	1,429,000	1,443,000
Texas	392,000	454,000	429,000	447,000	258,000	508,000	501,000
Calif.	1,067,000	1,229,000	1,130,000	1,252,000	473,000	529,000	552,000
Colo. & Utah	265,000	b607,000	227,000	b571,000	350,000	b777,000	741,000
Ore. Wash. & Mont.	377,000		424,000		424,000		
	15,503,000	b16,467,000	16,735,000	b17,950,000	18,440,000	b21,157,000	a22,640,000

a/ Revised. b/ Figures include estimate for one plant each in Indiana and Utah and are subject to revision.

Estimated clinker (unground cement) at the mills at end of each month, 1925 and 1926, in barrels

Month	1925	1926	Month	1925	1926
January	7,017,000	9,074,000	July	6,961,000	- - - - -
February	8,497,000	10,931,000	August	5,640,000	- - - - -
March	9,962,000	12,284,000	September	4,561,000	- - - - -
April	9,731,000	12,934,000a	October	4,086,000	- - - - -
May	9,053,000	11,619,000	November	5,013,000	- - - - -
June	7,937,000	- - - - -	December	6,469,000	- - - - -

a Revised.

Production, shipments, and stocks of finished Portland cement, by months, in 1925 and 1926, in barrels.

Month	Production 1925	Production 1926	Shipments 1925	Shipments 1926	Stocks at end of month 1925	Stocks at end of month 1926
January	8,856,000	7,887,000	5,162,000	5,672,000	17,656,000	20,582,000
February	8,255,000	7,731,000	6,015,000	5,820,000	19,897,000	22,384,000
March	11,034,000	10,355,000	10,279,000	9,539,000	20,469,000	23,200,000
1st quarter	28,145,000	25,973,000	21,456,000	21,031,000	- - - - -	- - - - -
April	13,807,000	a12,401,000	14,394,000	a12,961,000	19,882,000	a22,640,000
May	15,503,000	b16,467,000	16,735,000	b17,950,000	18,440,000	b21,157,000
June	15,387,000	- - - - -	17,501,000	- - - - -	16,409,000	- - - - -
2d quarter	44,697,000	- - - - -	48,630,000	- - - - -	- - - - -	- - - - -
July	15,641,000	- - - - -	18,131,000	- - - - -	13,896,000	- - - - -
August	16,419,000	- - - - -	18,383,000	- - - - -	11,952,000	- - - - -
September	15,939,000	- - - - -	17,711,000	- - - - -	10,247,000	- - - - -
3rd quarter	47,999,000	- - - - -	54,225,000	- - - - -	- - - - -	- - - - -
October	15,992,000	- - - - -	15,309,000	- - - - -	10,979,000	- - - - -
November	13,656,000	- - - - -	10,187,000	- - - - -	14,534,000	- - - - -
December	10,713,000	- - - - -	6,917,000	- - - - -	18,365,000	- - - - -
4th quarter	40,361,000	- - - - -	32,413,000	- - - - -	- - - - -	- - - - -
	161,202,000	- - - - -	156,724,000	- - - - -	- - - - -	- - - - -

a Revised. b Includes estimate for two plants and subject to revision.

Men and Mills

Notes from the Field

Alabama Portland Cement Co. to Improve Plant

The Alabama Portland Cement Company of Birmingham, Ala., announce that they will spend $250,000 on the improvement of their plant at North Birmingham. This plant was recently bought from the Phoenix Portland Cement Company and is now a part of the International System. Its capacity is approximately 1,000,000 barrels per year.

Additional machinery will be installed incident to the change in process, and new buildings will be erected. The company has a packing plant, estimated to cost $50,000, under construction. Engineers are now at work on the preliminary plans for the new construction and work will be started in the fall on the new improvements.

Kosmos Company Adds Two New Tow Boats to Fleet

The Kosmos Portland Cement Company of Louisville, Ky., has recently placed in service on the Mississippi River, operating out of Louisville, two new Diesel engined tow-boats—the Kosmortar and the King's Landing.

The boats were built by the Nashville Bridge Company, Nashville, Tenn. They are 75 ft. long, beam 19 ft., draft 4 ft., 3 in. They are of the twin screw type with steel hull construction and wood cabins.

Begin Construction of New Ohio Cement Plant

It is reported that the Dayton Portland Cement Company of Dayton, Ohio, has started construction on their new mill to be built at Germantown, Ohio, near Dayton. Work on the construction of the laboratory and office building will be undertaken before the mill itself will be contracted for.

The Dayton Portland Cement Company has acquired the rights for the manufacture and sale of Super-cement in the state of Ohio and the new plant will be used for its manufacture. Super-cement is a patented product in which only one and a half per cent of gypsum is used and one and a half per cent of Catosoll, a patented mixture of plaster of paris, tannic acid and another ingredient which take the place normally used by the other one and a half per cent of gypsum.

Plans for the new mill are well along toward completion. A. F. Miller of Jackson, Mich., is the consulting engineer who designed the plant and who will supervise its erection.

Officers of the company are: James F. Gibbons, of Dayton, Ohio, president; Adam Gilbert, of Germantown, Ohio, vice-president; and Bascom Parker, of Niles, Mich., secretary and treasurer. Directors are: James F. Gibbons, Adam Gilbert, Bascom Parker, John M. Sheesley and I. L. Holderman.

A research fellowship has been established at the Bureau of Standards by the Atlas Lumnite Company to provide for continuing experimentation and study of concrete proportioning and the effect of water on concrete made of Lumnite and of other cements of high alumina content.

Warrior Cement Company Builds Mobile Warehouse

Mobile, Ala., is being developed into a cement export center. The Warrior Portland Cement Company has erected a 60,000-sack storage warehouse and unloader at Mobile, Ala., at a cost of $20,000 and started barge lot shipments to Mobile on June 1.

All operations of transfer from barge to warehouse or from warehouse to truck or railroad car are mechanical. Three barges of cement are reaching Mobile weekly from the cement plants over the Warrior River Route.

The Louisville & Nashville Railroad has agreed to a rate of 11½ cents per thousand pounds on shipments of cement from points in the Birmingham district to points in the state of Florida.

Dexter Company Buys Railway

It is reported that the Dexter Portland Cement Company of Nazareth, Pa., has bought the franchises of the Allen Street Railway Company, known locally as the Nazareth-Bath trolley line.

Some months previous the Dexter company bought the Penn-Allen cement plant near Bath. This plant has no limestone quarry. The Dexter plant has plenty of limestone and can run the limestone from this quarry over the electric line on flat cars to the Penn-Allen plant.

New Cement Plant Projected at Bath, Pa.

Application has been made by the newly organized Bath (Pa.) Keystone Portland Cement Company for a charter. The company was promoted by Fred B. Franks, former mill manager of the Bath Portland Cement Company.

The new organization is planning the construction of a modern cement plant estimated to cost in the neighborhood of $3,000,000. Some 200 acres of land, just west of Bath, Pa., have been purchased by the company.

The Gulf, Colorado & Santa Fe Railway asked permission to construct an extension near Dallas, Texas, which would serve the Texas Portland Cement Company and other industrial plants. The line would be located between the tracks of the applicant and the Texas & Pacific Railway.

Luther G. McConnell has been appointed as General Sales Manager and Frederick A. Boeye as Assistant Sales Manager of the North American Cement Corporation with headquarters at 285 Madison Ave., New York.

The Manitowoc Portland Cement Company announces the election of H. Vanderwerp to the office of Vice President. Mr. Vanderwerp, who was formerly Assistant General Manager, will continue to make his headquarters at Manitowoc, Wis.

Contractors from many New Jersey towns, members of Boards of Freeholders and members of the New Jersey Builders and Material Dealers Association, were guests of the Lehigh Portland Cement Company at the new plant at Sandt's Eddy, near Martin's Creek, Pa., where they inspected the new cement mill, one of the most modern plants operating.

Bert Swett, Vice President and Eastern Sales Manager, and Ernest Ashton, Vice President and Chemical Engineer of the Lehigh Company spoke to the visitors on behalf of the company.

The New Egyptian Portland Cement Company, Detroit, has awarded a general contract to the MacDonald Engineering Co., Chicago, for a four-story and basement addition to its mill at Port Huron, Mich. The addition will be 50x70 feet in plan and will cost about $200,000 with equipment. John A. Acker, Chicago, is the engineer.

The Cosmos Portland Cement Company, Louisville, Ky., announce the appointment of A. W. Horner as Vice President and General Sales Manager of the company, effective May 1, succeeding O. M. Clark, who retires to engage in other business. At the same time A. C. Brown, Superintendent, will become Vice President and Plant Manager.

A demonstration prize concrete house has been completed in West End, Birmingham, Ala., by the Lehigh Portland Cement Company. This house is one of four which the company has constructed in the United States.

A new cement kiln, 11 ft. 6 in. inside diameter and 203 ft. long, is being built by the Manitowoc Engineering Works, Manitowoc, Wis., for the California Portland Cement Company for installation at their plant at Colton, Calif.

The Robert June Engineering Management Organization of Detroit has moved to larger quarters at 2208 West Grand Boulevard where it now occupies the entire building. The new building gives the organization greatly increased facilities.

T. R. Sanders, 180 Milk Street, Boston, has recently been appointed the Rhode Island representative for Foote Bros. Gear & Machine Company of Chicago. Mr. Sanders' headquarters will be in New York City.

About thirty officials, engineers and salesmen, members of the organization of the Great Western Portland Cement Co., with a plant at Milford, Kansas, recently held their annual conference at Excelsior Springs, Missouri.

Among those in attendance were: Page Golsan, vice-president; Wm. Volker, treasurer and principal owner; R. S. Schultze, construction engineer; R. M. Johnson, purchasing agent; J. H. Smedley, comptroller; C. C. Caron, plant engineer; P. C. Blaise, products engineer; E. G. Barnes, chairman of the convention; Louis Rosner, general sales manager; H. H. Blaise, superintendent, and among the salesmen and others were "Ding" Burton, W. G. Walton, J. L. Murphy J. C. Carroll, Jr., Harry Harden, Thos. E. Railsback, A. A. Ford, C. O. Thomas, L. W. Rogers, C. B. Cassity and J. G. Bates of the Bates Valve Bag Co. and A. A. Anderson of the Portland Cement Association of Chicago.

In other years these annual meetings have been held in Kansas City, Excelsior Springs being chosen this year as an experiment, with a view to sticking close to business and going over the many new problems constantly arising with reference to the development of the cement industry. The Great Western Co. operates throughout 14 states, a big percentage of its product going into highway construction, the company furnishing much material to the Missouri Highway Commission for road construction.

The Penn-Allen Cement Company announces that their general offices are now located at Nazareth, Penn. Communications will reach them at that address.

Fuller Company to Handle Fuller-Kinyon System

The Fuller Co., Catasauqua, Pa., has been formed for the purpose of handling the Fuller Kinyon System for materials other than pulverized fuel.

In connection with the recent sale of the Fuller-Lehigh Co. to the Babcock and Wilcox Co., this part of the business was not included. The Fuller-Lehigh Co., however, has been granted the exclusive rights to this system for conveying pulverized fuels only, and all matters pertaining to the conveying of pulverized fuels should be taken up with the Fuller-Lehigh Co., Fullerton, Pa., it is announced.

Industrial Literature

Cleveland Worm Gear Speed Reduction Units, used by the *Phoenix Portland Cement Company* were discussed in a booklet containing a special study of the desirability of worm gear units as compared to belts and chains. The survey was made by the *A. C. Nielsen Company of Chicago* and the discussion was sponsored by *H. H. Leh, Superintendent of the Nazareth plant of the Phoenix Portland Cement Company.*

In the later part of 1923 the Phoenix Portland Cement Company installed a number of Cleveland Worm Gear Speed reduction units at their Nazareth plant. Some of these replaced belt and ordinary chain drives and others were installed in new sections of the plant. There are now 21 of these units in operation.

The plant produces over a million barrels of portland cement annually and operates for 24 hours a day. Under these conditions, it is claimed that no expenditures for repairs have been necessary and the company has just recently made requisition for another unit.

The reduction units are of various sizes. Driving motors vary from 3 to 20 H.P. with synchronous speeds of 900 and 720 R.P.M. The speed reduction ratios employed on the different units are 12⅓ to 1, 21½ to 1, 29½ to 1 and 36 to 1.

The report points out the safety features of these units as compared with belts or chains, the new units being completely enclosed. This complete enclosure is also valuable in this respect, that all dust is kept out of the gears which cuts down the wear on the contact surfaces.

Another feature claimed for the Cleveland units is the smooth action with which they operate. The oil in the drives needs to be changed only every 6 months.

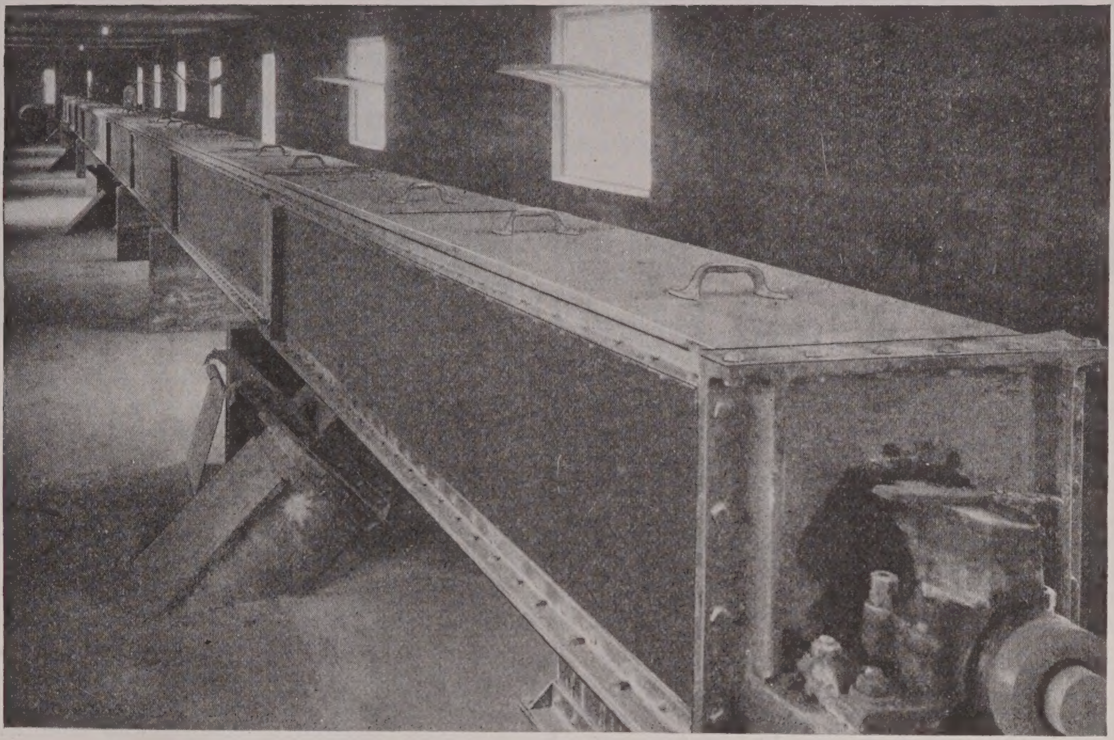
One example showing the economy of the Cleveland drives is given in the report. Costs of operating the Cleveland worm gear drive on the finishing cement tube mill elevator and conveyor is compared with the old belt and ordinary chain drive. With the new installation, an allowance of $25.00 per year for repairs was made, though up to the present time no repairs have been necessary. The total cost of operating and installing this one drive amounts to only $0.70 per 24-hour day.

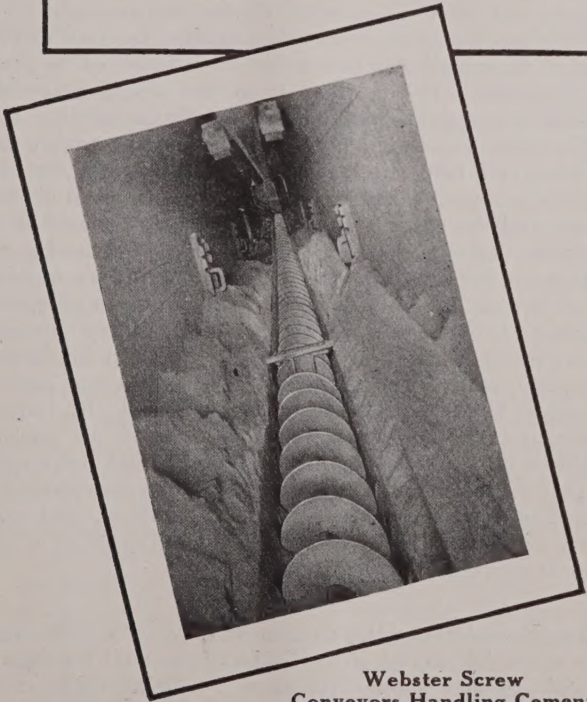
Formerly a belt and chain drive were used on this same cement elevator and conveyor. This, according to the report, was never a satisfactory drive. The belt caused much trouble because it usually broke without warning and stopped the operation of the entire plant. The cost of the belt, including the labor and material necessary to replace it, amounted to an average of $42.50 per year. The loss due to delay in operations amounted to a still larger item and is computed on the basis of an average of half an hour's delay each time a new belt was put on. The total cost of this one belt drive was $342.68 per year, or 37 per cent more than the Cleveland worm gear unit.

On the same basis, the report points out that similar savings in other installations caused a net saving of 27 per cent in actual operating cost as well as bringing such other benefits as greater safety, saving of space and freedom from shutdowns.

The Technology of the Manufacture of Gypsum Products—Bureau of Standards Circular No. 281—is a new and authoritative text on the general practice of mining or quarrying, transporting, crushing, drying, calcining and preparing of gypsum and gypsum products, as observed in plants throughout the country. It containus up-to-the-minute statistics on the production of gypsum, and contains a great deal of other information of value. The equipment and methods generally used are described in detail. The chemistry of the calcining process are discussed briefly. This interesting and valuable circular will soon be available to those interested. Copies may be secured from the Superintendent of Public Documents, Government Printing Office, Washington, D. C., at a nominal cost.

WEBSTER





Webster Screw Conveyors Handling Cement

Screw conveyors that give trouble-free service

Webster sectional steel flight screw conveyors are a good example of Webster efficiency and care in design and construction.

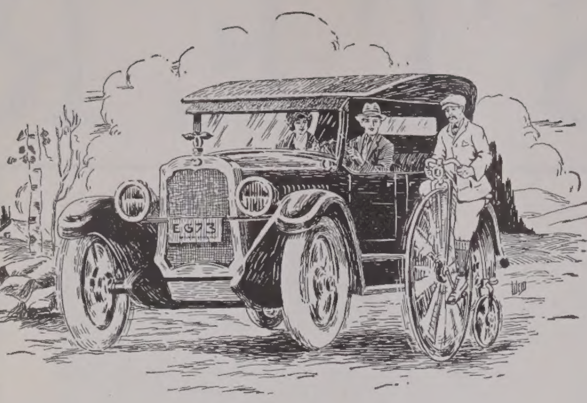
The sectional flights of this conveyor, cut from plate steel and rolled to form are uniform in thickness from center to edge. The lugs to which the flights are attached are spaced at short intervals and give added strength to the conveyor.

This sectional construction saves on the cost of repairs. Any sectional flights damaged can be removed and new flights inserted without removing and replacing flights on an entire sectional length.

Put your conveyor requirements up to Webster engineers. Write for catalog.

THE WEBSTER MFG. COMPANY
4500-4560 Cortland Street
CHICAGO

Index to Advertisers on Page 97 of This Section



From the Days of the High Wheel Bike

TUCKED away in the heart of Maryland is a factory that for half a century has been keeping in step with American Industrial progress. From the days of the "high wheeled bike" to the present era of de luxe motor cars, this factory has been producing quality products — products of the motive sort that have contributed much towards the pleasure and relaxation of all classes.

Through successive steps, from the manufacture of the ancient, high wheeled bicycle, the pneumatic tired "two wheeler," to the production of a present day quality motor car, this plant has used T. B. Wood's Power Transmission Machinery.

Installed years and years ago, Wood's Products are still performing efficiently and satisfactorily. And they will continue to perform in that manner, for Wood's Power Transmission Appliances are built to endure.

When you install Wood's Cast Iron Hangers and Pulleys you assure your factory a life time of dependable power transmission performance.

T. B. Wood Sons Co.
Chambersburg, Pa.

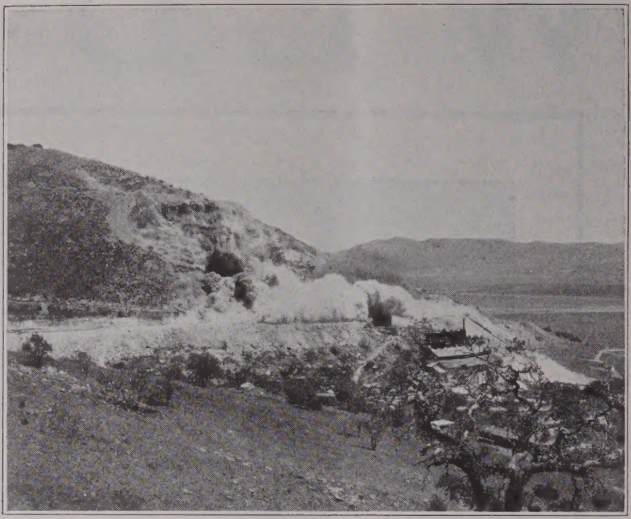
NEW ENGLAND BRANCH: Cambridge, Mass.
SOUTHERN BRANCH: Greenville, S.C.

Makers of Power Transmission Machinery Since 1857

BY INVITATION MEMBER OF
NEW YORK, U.S.A.

Shafting, Hangers, Pulleys, Flexible Couplings, Friction Clutches and the U. G. Short Center Belt Contactor.

Monolith Company Makes Record Quarry Shot



Sixty-two and one-half tons of dynamite were touched off Sunday, May 9, at the quarry of the Monolith Portland Cement Company's plant at Monolith, Calif., in the largest single shot ever made in a California cement quarry. Over 250,000 tons of limestone were sent tumbling down from the mountain, all of which landed on the quarry floor, thus making the entire yield available, according to company officials.

The blast was set off on the dot at 1 p. m. by Albert Degen, powder engineer of the Giant Powder Company, who supervised the dynamite loading in conjunction with W. S. Trueblood, plant superintendent, and J. A. Hanigan, quarry foreman. The time was scheduled for the benefit of several hundred spectators, who motored from Los Angeles and other communities to view the spectacle.

Three months were consumed in drilling for the "Coyote Tunnel Shooting" and two weeks were required to place the dynamite. The entire cost to the company for the blasting was approximately $26,000, officials said.

The entire mass was so carefully loaded that there was no loss, and inspection after the blast showed that the material was uniformly broken up. Both standard electric wiring and the cordeaux fuse system, which is said to be the faster, were used. Three steam shovels are used in the quarry and the installation of a 48x60 Traylor jaw crusher, which is now in operation, makes it possible to accept all limestone brought down, without any secondary shooting.

Coy Burnett, president of the Monolith Portland Cement Company, with Wilmar Evans, vice-president and general manager, C. A. Low, sales manager, and T. R. Larson, traffic and assistant sales manager, offered an unusual angle to the occasion by inviting the general public and staging the spectacular explosion at a time convenient for all. This plan resulted in no little publicity, and some seven or eight hundred spectators got the thrill of a lifetime in viewing the pre-arranged eruption.

The United States Department of Commerce will undertake a special survey of the building material business in Florida in that state. This survey is being made at the request of the Florida Shippers Regional Advisory Board of the American Railway Association. The survey will cover cement, brick, tile, lumber, sand, gravel, lime rock and asphalt and will deal with the production, turnover, stocks and distribution of these materials. A. Lane Crichar, of the commerce department's transportation division, will direct the survey.